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REHABILITATION OF MALNOURISHED PRESCHOOL CHILDREN WITH NUTRI-PAK

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SUMMARY

The results of the food consumption study suggested that the calorie and protein intakes of 1° and 2° malnourished preschool children in the study area were much lower than the RDA and thus these children should benefit from a supplementary feeding project. However, after 42 days of supplementation with Nutri-Pak, the project's objective of increasing by 5%, the percent standard weight for age of at least 60% of the subjects was not achieved since only one child's weight reached this target. From the records of monitoring, it was noticed that the low consumption of Nutri-Pak, a partial replacement by the the food supplement of the children's diet in the home, uncooperative mothers, and illness or disease factors had contributed to the much lower weight gains than expected in most of the children.

INTRODUCTION

Mild to moderate forms of protein-energy malnutrition (PEM) in young children is widespread in developing countries and much attention has been directed to the identification and rehabilitation of preschool children currently in this condition. Although it is recognised that the solution to the PEM problem requires a multisectorial effort based on long-term measures aimed at socio-economic development due to the multiplicity, interdependence and inter-relationship of its factors, nevertheless, as an interim solution and from the moral point of view, supplementary feeding programmes are necessary since there will be many preschool children whose poor nutritional status calls for immediate and specific attention. In this context, members of the Association of South-East Asian Nations (ASEAN) have produced appropriate low-cost, high-calorie and high-protein foods for the purpose.

In this report, after a preliminary food consumption study in a group of malnourished preschool children, they were provided with a food supplement (Nutri-Pak) for a period of 42 days. The objective of the feeding was to increase by 5%, the percent standard (% std) weight for age of at least 60% of the subjects.

MATERIALS AND METHODS

Subjects

The project involved 12 Filipino families and 13 preschool children of ages 13-77 months who were residents of the *barrio* of San Vicente, Bulacan, Philippines. These preschool children were identified as second degree (2° i.e. 60.1-75.0% std weight for age) malnourished by an *Operation Timbang* conducted in the *barrio* a

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TABLE I
COMPOSITION OF NUTRI-PAK

Variety	Ingredients in grams						
	Munggo	Rice	Oil	Skimmed Milk	TVP*	Cocoa	Total (grams)
Caldo especial	—	55	15	15	5	—	90
Munggo	15	55	15	15	—	—	100
Champorado especial	15	55	15	15	—	5	105

* Textured vegetable protein (Source: Research and Development Section (RDS), Nutrition Centre of the Philippines (NCP))

month prior to the present project.

Food consumption study

Single 24-hour food recalls of the preschool children were conducted on Tuesday and Wednesday before the start of the supplementary feeding by interviewing mothers during household visits. Each food item consumed by the child was converted into equivalent calories and protein by referring to the tables of 'Standard Weights and Measures' and Food Composition compiled by the Food and Nutrition Research Institute (FNRI, 1968 and 1980) in Manila.

Food Supplement

A high-calorie, high-protein, ready-to-cook food product — Nutri-Pak was used in the feeding, which is at present produced by several municipal Nutri-Pak plants for the Food Assistance intervention scheme under the Philippine Nutrition Programme (PNP). The three Nutri-Pak varieties used were purchased from the Philippines Nutri-Foods Corporation at P1.50 (M$0.50) per pack and their composition is shown in Table I.

Each pack of Nutri-Pak weighs about 100 grams and provides about 440 Calories and 14 grams protein or one-third and one-half the Recommended Dietary Allowance (RDA) for calories and protein, respectively, of a preschool child (RDS, NCP).

Measurement of weight

Weight was measured with a Healthometer weighing scale, capacity 65 kg, to the nearest 0.05 kg, after calibrating the instrument with a 5.0 kg mass. The preschool subjects were weighed in light clothing and without footwear on three consecutive days at the start and again at the end of the period of supplementation. The mean weight of each subject at the start and end of the feeding was used to calculate the % std weight for age. Weights of the children were monitored at six-day intervals in their homes and the results were plotted on a growth chart for each child.

Feeding

The first six days of feeding was centre-based where the children were each given a bowl of cooked Nutri-Pak (equivalent to about 200 Calories) per day as mid-morning snack. A demonstration for cooking Nutri-Pak was also held for the mothers at the centre. The subsequent 36 days' feeding was home-based where the children were provided with one pack of Nutri-Pak per day. Distribution of Nutri-Pak was by household visits once every three days and on these visits, Nutri-Pak intake by the preschool subject in the home was monitored by 'diary cards' and a questionnaire.

Nutrition education for mothers

Prior to the feeding, a teacher in the *barrio*

was oriented by the project investigators so that she could explain to the mothers the causes and consequences of PEM in their young children, the nature and purpose of the supplementary feeding. During the household visits, it was emphasised to the mothers that Nutri-Pak was to be served as *merienda* (mid-morning or mid-afternoon snack) only, that it was meant solely for their children in the project, and that Nutri-Pak should not replace the children's usual meals in the home. In addition, the growth charts of the children were explained to the mothers who were also briefed on how to make their own 'Nutri-Pak' with readily available ingredients like rice, beans, shrimps and *ikan bilis*.

Community participation

This was encouraged in the project by inviting the head-mistress in the *barrio* to brief the mothers on orientation day regarding project activities, in the presence of the *barrio* captain and other key personnel in the study area. The two *purok* (sub-section of a *barrio*) aides in the project, besides serving as interpreters when necessary, also helped to encourage mothers to support the project.

RESULTS AND DISCUSSION

Profile of the children

The nutritional status of the preschool subjects at the start of the feeding project is presented in Table II.

From Table II, it is observed that five of the children, identified as 2° malnourished by the *Operation Timbang* a month prior to the project, were actually at first degree (1° i.e. 75.1-90.0% std weight for age) level 4 at the start of the supplementary feeding. Four children were not

TABLE II

NUTRITIONAL STATUS OF THE CHILDREN AT THE START OF THE SUPPLEMENTARY FEEDING

Child No.	Sex	Age [months]	Nutritional status	
			Degree	Level+
1	F	60	1°	4
2	F	68	1°	4
3	F	16	2°	5
4	F	62	1°	4
5	M	13	1°	4
6	F	77	2°	6
7	F	68	2°	5
8	M	33	2°	5
9	F	25	2°	5
10	M	29	1°	4
11	F	30	2°	7
12	F	30	2°	7
13	F	14	2°	6

\+ Based on classifying weights according to **10 nutritional levels which were adopted** from Bulatao-Jayme (1971)

TABLE III

DAILY CALORIE AND PROTEIN INTAKE OF 1° AND 2° MALNOURISHED PRESCHOOL CHILDREN IN THE PROJECT

Child No.	RDA		From 24-hour recall		% RDA	
	Calories	Protein [g]	Calories	Protein [g]	Calories	Protein
1	1640	32	1163	23	71	72
2	1640	32	839	18	51	56
4	1640	32	342	10	21	31
5	1310	26	771	17	59	65
6	1640	32	879	28	54	88
7	1640	32	606	21	37	66
8	1310	26	436	9	33	35
9	1310	26	762	24	58	92
10	1310	26	1078	24	82	92
11	1310	26	923	18	70	69
Mean intake					54	67

included in the data analysis because three of them (child No. 5, 11 and 12) became seriously ill while child No. 13 died shortly after the start of the project.

Food consumption study

Table III highlights the findings from the food consumption study and compares the daily calorie and protein intakes of the subjects with their RDA (FNRI, 1977).

The 24-hour food recalls revealed that the majority of the children ate five times a day namely breakfast, mid-morning snack, lunch, mid-afternoon snack and dinner. In spite of the adequate number of meals a day, the average level of intake of both calories and protein for the group were apparently low, being only 54% and 67% of the RDA for calories and protein, respectively (see Table III). These levels suggest that there was a greater deficit of calories than protein in the diets of these 1° and 2° malnourished preschool children which would agree with the findings of Panlasigui *et al* (1975) in a group of 2° malnourished preschool children. However, it must be emphasised that the 24-hour food recall method used has a tendency to under-estimate mean food intake (Margeau, 1973).Besides, the small sample size involved in the study and the single recall used would make the results be, at best, only an approximation.

Although the protein content in a pack of Nutri-Pak was adequate to cover the RDA deficit, the amount of calories provided by the pack appear insufficient to make up for the daily deficit in calories in the present group of children. Nevertheless, the children should benefit from the significant additional calories provided by the food supplement.

Increment in weight and % std weight for age

After the period of supplementation, the weight gains of the children ranged from -0.1 to 1.1 kg (see Table IV) which were much lower than expected. The mean weight increment of 0.42 kg for the present group is much lower than

TABLE IV

WEIGHT AND WEIGHT FOR AGE OF THE PRE-SCHOOL SUBJECTS BEFORE AND AFTER THE SUPPLEMENTARY FEEDING

Child No.	Weight [kg]			Weight for age [% std]		
	Before	After	Increment	Before	After	Increment
1	12.95	14.05	1.10	76.6	81.7	5.1
2	14.15	14.90	0.75	78.1	81.4	3.3
3	8.10	8.40	0.30	75.0	76.4	1.4
4	13.05	13.45	0.40	75.8	76.9	1.1
6	12.55	12.75	0.20	65.0	65.7	0.7
7	13.50	13.85	0.35	74.5	75.7	1.2
8	9.45	9.70	0.25	70.0	71.3	1.3
9	9.30	9.80	0.50	75.0	78.4	3.4
10	9.90	9.80	—0.10	76.7	74.2	—2.5
Mean increment			0.42			1.7

the 0.97 kg (children received centre-based supplementation) but higher than the 0.24 kg (children received 'take-home system' supplementation) obtained for two separate younger groups of 2° and third degree malnourished preschool children who were supplemented with 100-200 Calories daily for a period of one month (Almero *et al,* 1978 and Velandria *et al,* 1978).

Although the mean weight of the present group of children increased significantly ($p < 0.005$) after 42 days of supplementation, it was difficult to determine whether the improvement in weight was in fact due to the supplementation because of the absence of a control group. However, due to the small number of 2° malnourished preschool children in the study area, and that this was a service project, total inclusion of the malnourished children in the feeding was desirable.

After the period of supplementation, only one child had increased in % std weight for age by 5% (see Table IV). This means that the objective in the project of increasing by 5%, the % std weight for age of at least 60% of the subjects was not achieved.

A 5% increase in % std weight for age was equivalent to weight gains of 0.7-1.1 kg for the subjects (see 'Nutritional levels by weight for age in degree of malnutrition, % std and nutritional level, NCP). This amount of weight gain was reasonable to achieve if one considers that a preschool child who consumes one-third the RDA for calories (about 500 Calories) above his usual level of energy intake would gain about two kg after 42 days if the 'supplemented calories' are all converted into fat and protein tissue, assuming no illness or change in physical activity.

Nutri-Pak intake and supplementary value

The results of monitoring the regularity and amount of Nutri-Pak intake, supplementary value of Nutri-Pak in the home, and the general health of the children during the project are summarised in Table V.

TABLE V

SOME MONITORING RESULTS REGARDING FACTORS AFFECTING NUTRI-PAK [NP] INTAKE AND SUPPLEMENTARY VALUE IN THE HOME

Child No.	Presence of minor illness during study	Usual No. of family members * sharing one pack of NP	NP served regularly	Amount of food eaten at lunch or dinner reduced
1	Yes	2	Yes	No
2	Yes	2	Yes	No
3	No	2	Yes	No
4	Yes	2	Yes	Yes
6	No	3	No	No
7	No	3	No	Yes
8	Yes	5	Yes	No
9	Yes	3	Yes	No
10	No	2	No	No

* Including the preschool subject

Other than the three children who were seriously ill and excluded from the data analysis, five other children (see Table V) were reported by their mothers to be 'not feeling well' for periods of up to three days during the period of supplementation. These short episodes of illness probably adversely affected the weights of the children which could account for their much lower weight gains than expected.

The 'diary cards' used in the project revealed that for all the subjects, Nutri-Pak was shared with other members of the family, the number of people sharing one pack of Nutri-Pak ranging from two to five. This would mean that the children were consuming much less of the food supplement than was intended for them in the feeding. This was apparently so in spite of repeated messages to the mothers during the household visits that the food supplement was only meant for their children in the project and that if their children did not consume enough of the food as *merienda,* they would 'not gain weight'. Thus, the frequent household visits for the home-based feeding was apparently insufficient to prevent a low consumption of the food supplement and a partial loss of the supplementary value of the food. It would seem that in future projects of this nature, greater motivation of mothers and actual supervision of the feeding may be necessary. This is important in view of the fact that the Food Assistance intervention scheme under the PNP distributes Nutri-Pak to beneficiaries once every week or fortnight (The PNP 1975-1976, NCP).

From Table V it is observed that after consuming Nutri-Pak, the amount of food eaten by the child at lunch/dinner was reduced in two children (child No. 4 and 7). This might be due to the bulkiness of Nutri-Pak in its cooked form; one pack of Nutri-Pak provided two relatively large servings which were difficult for the young child to finish in the morning and afternoon *meriendas.* Thus, a less bulky food supplement is recommended. Table V also shows that the

mothers of child No. 6, 7 and 10 did not cook Nutri-Pak regularly. Thus for these children, there was probably little or no calorie intake above their usual calorie consumption which would explain their much lower weight gains than expected.

Although different varieties of Nutri-Pak were distributed to each child on a household visit to prevent monotony, two children seemed to dislike the food supplement; child No. 6 refused to eat it after 17 days of supplementation and an alternative snack food was provided for her. Thus, the provision of three varieties of Nutri-Pak in a 42 day supplementary period was insufficient to prevent monotony; the provision of *different* food supplements during this period may be necessary.

Two of the children (child No. 3 and 5) were on a milk diet prior to the supplementary feeding. Child No. 5 who was bottlefed had difficulty adjusting to eating Nutri-Pak and hence it was not surprising that for this child the intake of the supplement was very low.

In any supplementary feeding project, the education of the mother (or father if he is an important determinant of food habits in the family) should be given at least equal emphasis as the feeding of the child. Although this was considered in the present project, the education of the mothers was provided on a bery informal basis during the household visits, the impact of which was uncertain due to the time constraint and the language problem experienced by the project investigators.

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